

S-8
Dr. Crouch

W8EDU

Case Amateur Radio Club Newsletter

October 1965

IMPORTANT NOTICE !!!

The Diff photo of the radio club will be taken on November 2, at 11:15 a.m. during our meeting in the shack. Please wear a white shirt, sports jacket and tie.

Anyone interested in radio theory or code practice classes, contact Dave Prestel (W8AJR) Old Main box C-7. Classes are currently being held in the shack on Saturdays at 13:00 hours.

If you have any ideas for articles for this newsletter, or if you have a particular gripe about something, contact Bill Myerson (K3SEA) Old Main box H-49. Ditto stensils are available to members for these articles.

If you wish to help with the tracking of Oscar IV, contact Bob Antinone (K8SVS) Old Main box D-1.

The current officers of the club are:

Steve Moro	President	Old Main box H-43
Andy Fedak	Vice	T-31
Jerry Iannadrea	Secretary	G-150
Bill Myerson	Treasurer	H-49
Faculty Advisor	Dr. Marshall F. Crouch	room S-8

ANTENNA FACTS AND FALLACIES

Part 1 - Gain and its Measurement

While looking through a few electronic catalogs, I came across several interesting claims for antenna gains from some well known antenna manufactures. Below are a few of the absurd claims.

CushCraft 6 meter halo - "...from 5 to 15 db gain."
Scott-Master 9 element 2 meter beam - "Foward gain, 14 db."
Hy-Gain (listed below) - "New total performance beams.
Scientifically staggered optimum spaced beams."

<u>Antenna type</u>	<u>Foward Gain</u>
3 elements	10 db
4 "	12.7
6 "	15
11 "	19

How does one calculate foward antenna gain? A common engineering technique is to pick a point source antenna (radiates uniformly in all directions) and use it as a reference point, i.e., gain is 0 db. Known as an isotropic radiator, it exists only in theory. Applying this concept to the common half wave antenna, we find that its gain over an isotropic radiator in its most favored direction is 2.14 db. However, the most popular reference antenna used today is the dipole which is assigned a gain of 0 db.

You will find this used in amateur magazines and journals. Still another reference is the relative gain over a $\frac{1}{2}$ wave vertical.

Manufacturers of horizontally polarized mobile antennas often compare the antenna's gain with the horizontally polarized signals from a vertical whip. They fail to tell you which system they are using, thus implying that in the case of the 6 meter Cush Craft halo, it has more gain than most 11 element beams.

Figure 1 contains design information for yagi antennas.

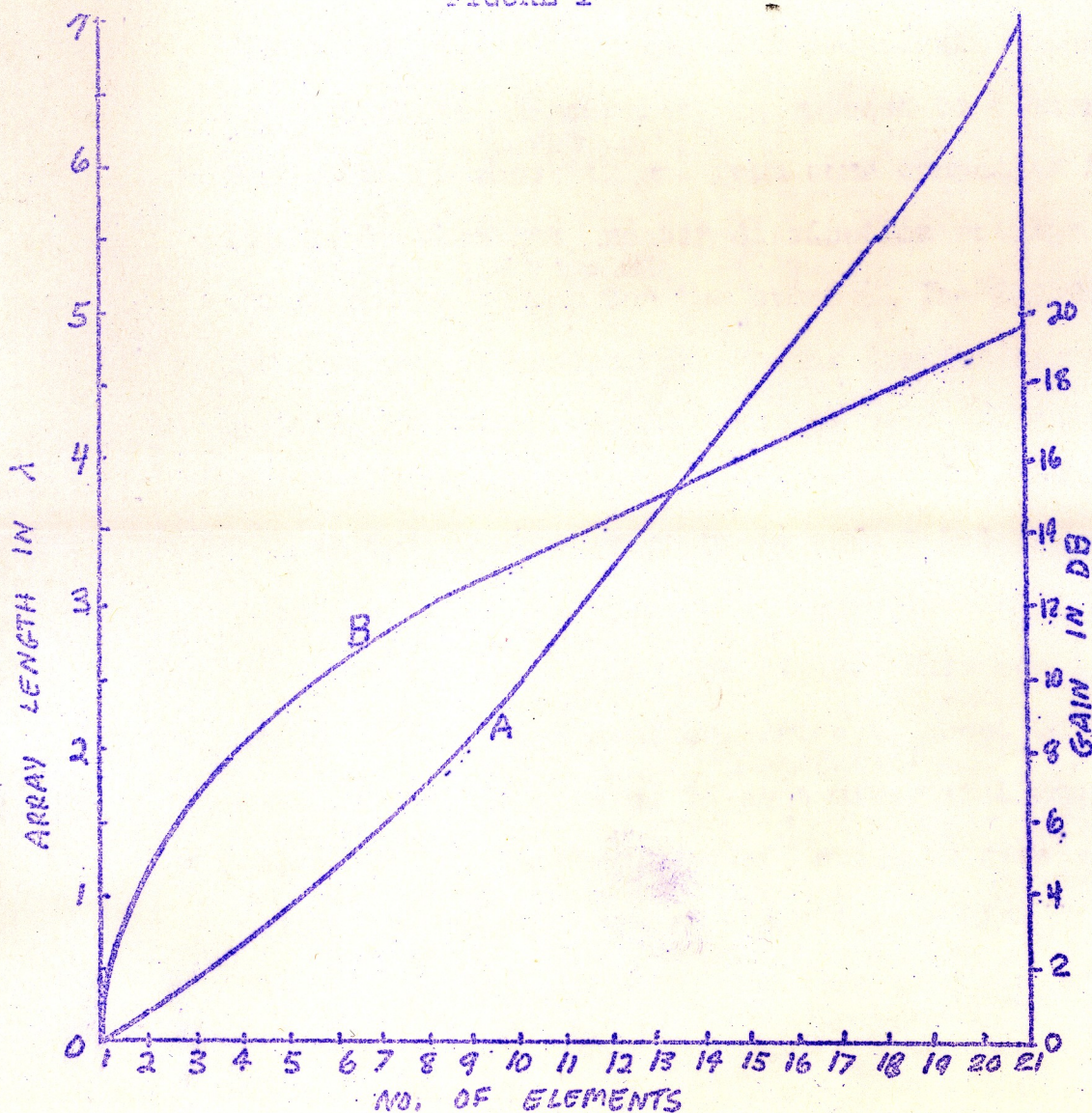
Curve A shows the optimum boom length in wavelengths for any number of elements. Curve B shows the maximum gain that can be

expected when the design information of Curve A is used. Note that the gain of a 1 element yagi (dipole) is 0. This information is obtained from the ARRL VHF Manual (1965).

How can we practically measure gain? On the air reports can give us at best rough approximations. Variations in signal strength over the path, fluctuations in the avc circuit, drift, voltage changes, etc., limit most measurements to a 1 or 2 db accuracy. Many S-meters are poorly calibrated, nonlinear, and subject to saturation near full scale readings. Hopefully, the day will come when we can believe antenna manufacturers specifications.

--- Steve Moro

FIGURE 1



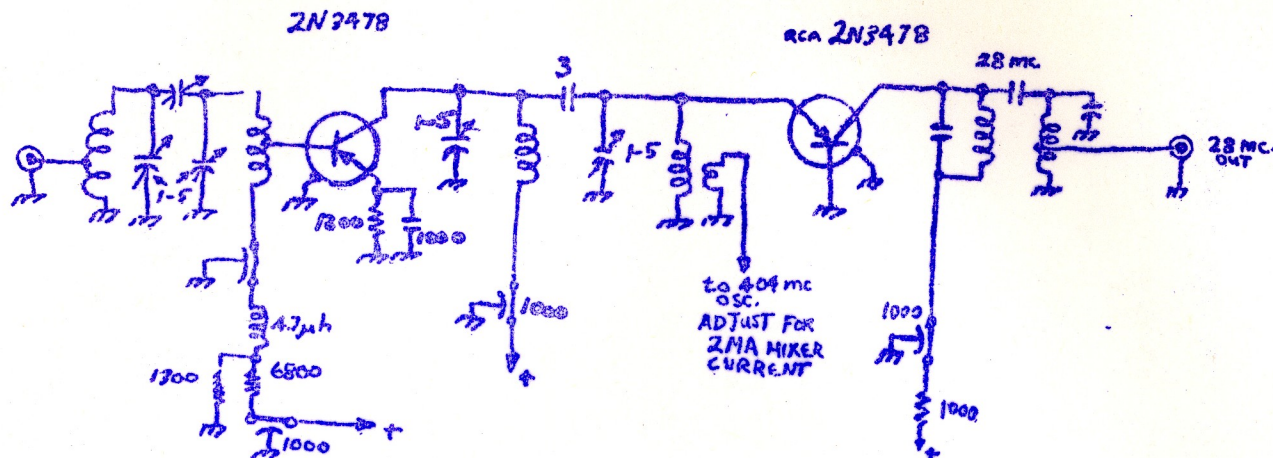
TRANSISTOR FACTS

Rejoice all ye who hear this message. You to, John Q. Ham, can now afford to use solid state devices and circuitry in your station.

Within the last year or so transistors have been put on the market which perform equally as well as tubes, in some cases even better. Yet these transistors are well within the budget of anyone who is going to build anything that he doesn't have all the parts for. This article will cover some of these new transistors.

A new transistor putout by Fairchild is the 2N3638. This PNP type is designed to be used in place of the older 2N404. It features a typical current gain bandwidth product of 150 megacycles, as opposed to a current gain bandwidth of about 10 mc. from some companies for the 2N404. It also has greater dissipation ratings (300 mw compared to 150 mw for the other). The 2N3638 is silicon in stead of germanium, and so has greater temperture stability. This transistor can be used in logic and multivibrator circuits (such as keyers, square wave generators, frequency dividres etc.) and linear circuits (such as audio amplifiers and even low level rf.).

RCA, has announced the 2N3478. This one is a low noise vhf. amplifier-mixer. Price is about \$2.00 . How good is it? Well, using it as a mixer at 432mc. with separate oscillator but no rf. stage it gets a 7 db. noise figure. With one rf stage (same kind of transistor) the noise figure is 4 db. One tube type converter using \$14.00 nuvistors has a noise figure of 7.5 db.

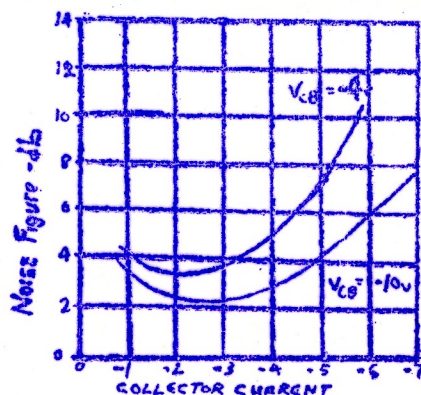
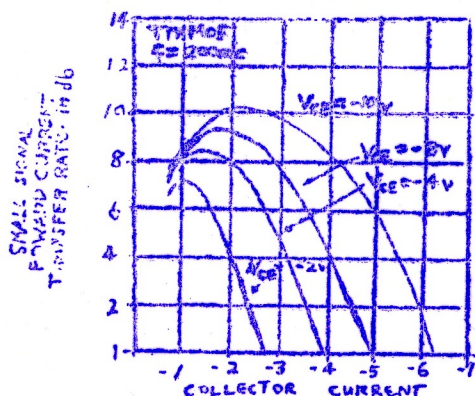


CIRCUIT of 432MC. CONVERTER USING 2N3478's

Some entries by G.E. are the 2N3662 and 2N3663. These have a noise figure of 4db. at 60 mc. Their current gain bandwidth product is 1100 mc. In oscillator service they put out 30 milliwatts (mw) at 500 mc. and 11.5 mw at 940 mc. These have a large quantity price of about 83¢. They are good for rf. and if. amplifiers and oscillators for television, FM., and converters.

Another G.E. entry is the 2N3721. This one has a current gain bandwidth of 120 mc. Its quantity price is 20¢. It is rated as high performance and features high gain. The 2N3402-5 series feature 900 mw. dissipation. The 2N3404 and 2N3405 have a maximum collector voltage of 50; the others have a 25 volt rating. The 2N3403 and 2N3405 have a small signal forward transfer ratio of 180 to 540 whereas the others are 75 to 225. The prices for these transistors are 91¢, 96¢, \$1.20, and \$1.25.

Texas Instruments has a series of low noise vhf. transistors too, the series TIXM01-8. The TIXM05 gives a noise figure of 2.8 db typical at 200 mc. with a collector voltage of -10 and currents of -1.5 ma. Input impedance is 75 ohms. Price is a huge 52¢.



There will be more to come in a later Transistor Facts.

David Sinking